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ORIGINAL

AUSTRALIA

Patents Act 1990

PROVISIONAL SPECIFICATION

Invention Title: "Pipe Insert"

The invention is described in the following statement:

"Pipe Insert"

Field of the Invention

The present invention relates to a pipe insert and also to a method of connecting at least two pipe ends using such a pipe insert.

Background

Process piping installations are common to many industries, including the oil and gas, petrochemical and mining industries.

A requirement associated with most major projects concerning such installations is that the piping be hydrostatically and/or pneumatically tested, prior to pre-commissioning, so as to ensure conformity with design and operating parameters. Such testing is generally followed by a cleaning phase which may involve subsonic air blasting. Until the installation is commissioned, it is not desirable to expose control elements, such as valves and like elements, to the rigours that will be experienced during assembly of the installation, cleaning of the assembled installation and testing of the installation prior to commissioning.

For this reason, it is not uncommon for such control elements to be installed and then removed as many as three times over the course of construction, testing and cleaning. This generally involves construction of purpose-built temporary pipe inserts to replace each control element. In installations which incorporate tens or hundreds of control elements, this practice is unwieldy and wasteful because, in most instances, a new pipe insert is created each time for each control element and, where the installation is to be subjected to testing, each temporary insert must be fabricated to the same standards as the control element which it is intended to replace. Associated shortcomings in this regard include triple-handling and installation, which compromises the mechanical integrity of the pipe system, as well as the need to subject the temporary inserts to non-destructive testing to ensure their fitness for use during testing and

cleaning. This results in unnecessary expense, time delays and safety risks. In addition, there is an increased likelihood of damage to the control elements each time they are installed and then removed

Disclosure of the Invention

According to one aspect of the present invention, there is provided a pipe insert which in use is to provide a connection between at least two spaced pipe ends, the insert having at least two ends, the pipe insert being adjustable to be able to vary the relative displacement between the ends, each end having connecting means adapted to provide a sealing interconnection between that end and the respective pipe end.

According to a preferred feature of the invention, the pipe insert comprises a plurality of interengaged sections which are displaceable relative to each other to vary the relative displacement between the ends of the insert. According to a preferred feature of the invention, the sections are telescopically and sealingly interconnected.

According to a preferred feature of the invention, the sections are threadably interengaged, whereby the relative displacement is varied by varying the relative longitudinal position of the threadable interconnection between the sections.

According to a preferred feature of the invention, the connecting means are selectable from a plurality of connecting means adapted to connect to pipe ends of differing sizes.

According to a preferred feature of the invention, one of the sections is adapted to receive at least one of a selection of control elements. According to a preferred feature of the invention, that section is provided with at least one threaded, laterally-directed bore the at least one bore adapted to receive one of a selection of control elements.

According to a preferred feature of the invention, the ends of the insert are displaceable along a longitudinal axis.

According to apreferred feature of the invention, the ends of the insert are displaceable along at least two longitudinal axes which are angularly displaced from each other. According to one embodiment, the ends of the insert are displaceable along two longitudinal axes which are substantially perpendicular to each other.

According to another aspect of the present invention, there is provided a method of connecting at least two spaced pipe ends, the method comprising the steps of:

providing an insert as described above;

adjusting the insert to cause relative displacement between the ends of the insert according to the spacing of the pipe ends; and

connecting the insert to the pipe ends with the connecting means.

The invention will be more fully understood in the light of the following description of specific embodiments.

Brief Description of the Drawings

The description is made with reference to the accompanying drawings of which:

Figure 1 is a front view of an insert, according to a first embodiment of the invention;

Figure 2 is a cross sectional view of the insert as shown in Figure 1, fitted with a lifting eye and ball valve;

Figure 3 is a cross sectional view of an insert according to a second embodiment of the invention, fitted with a pressure gauge and fill/drain point; and

Figure 4 is a cross sectional view of an insert according to a third embodiment of the invention, fitted with a pressure gauge and lifting eye.

Detailed Description of Specific Embodiments

Each of the embodiments is directed to a pipe insert which in use is to provide a connection between at least two spaced pipe ends and is adjustable in at least one longitudinal axis according to the spacing of the pipe ends.

The pipe insert 10 according to the first embodiment, as depicted at Figures 1 and 2, provides a connection between spaced ends 11 of pipes.

The insert 10 is of a tubular form and is provided at each end with connecting means in the form of separately-formed flanges 12 which are adapted to be fixed to corresponding flanges 13 provided on the pipe ends 11 to mount the insert 10 to the pipe ends 11, thereby providing a sealed connection therebetween. The flanges 12 may be selected from a range of flanges having differing diameters, according to the diameter of each of the corresponding flanges 13.

The insert 10 is formed of a plurality of interengaged sections which, in the case of the embodiment, comprise a central section 16 and a pair of outer sections 18 received through either side of the central section 16. The sections are threadably interconnected in an end to end relationship whereby, by varying the relative longitudinal position of the threadable interconnection, the length of the insert 10 between the ends can be varied.

The central section 16 is provided with oppositely-handed internal threads 20 which extend inwardly from its ends. The outer sections 18 are provided at their inner ends with corresponding external threads 22 which interengage with the internal threads 20 to effect the threadable interconnection between the central section 16 and the outer sections 18.

The remainders of each outer section 18 are of a slightly reduced diameter relative to the inner ends, so as to enable the outer sections 18 to be received within the central section 16.

The position of each outer section 18 with respect to the central section 16 is adjusted by screwing that outer section clockwise or anticlockwise. The outer sections 18 may be adjustably displaced by different amounts with respect to the central section 16, as can be seen at Figures 1 and 2.

Annular locking caps 28 assist in providing sealing between the central section 16 and the outer sections 18. After adjustment of the length of the insert 10, the locking caps 28 are slid along the outer sections 18 and then secured to the ends of the central section 16 to engage respective end faces 27 of the central section 16. To this end, inner threads 30 are provided in the locking caps 28 which engage corresponding outer threads 32 provided at the ends of the central section such that the locking caps 28 may be screwed onto the central section 16. Notches 36, provided on the locking caps 28 and the central section 16, may be engaged by conventional hook spanners to apply sufficient tightening torque between the central section 16 and the locking caps 28.

Seals 26, received around the outer sections 18, are accommodated in recesses 24, defined between the locking caps 28 and inner end faces 27. The seals 26 are dimensioned so as to be appropriately compressed in the recesses 24 to effect sealing between the central section 16 and the outer sections 18.

The outer sections 18 are provided with oppositely-handed internal threads 41 so that they may receive further outer sections therein, in accordance with other embodiments as described below.

The outer sections 18 are provided, at their outer ends, with external threads 38. The flanges 12 are provided with bores 40 having corresponding threads 39 to

interengage with threads 38 such that the flanges 12 may be screwed onto, and thus mounted on, the outer sections 18. The removable nature of the flanges 12 means that the insert 10 has the versatility to be used with pipe flanges of varying diameters, types and ratings.

Seals 46 are received in recesses 44 defined between the outer end faces 42 of the outer sections 18 and the flanges 12. The seals 46 are dimensioned so as to be appropriately compressed in the recesses 44 to effect sealing between the outer sections 18 and the flanges 12.

The wall of the central section 16 comprises opposed radial bores 50 and 52 which are provided with left-handed and right-handed threads respectively. Each bore is adapted to receive sealingly one of a selection of control elements which may include a lifting eye, a ball valve lever assembly, a pressure gauge and a fill/drain point. By way of example only, the selected control elements fitted to the first embodiment as depicted in Figure 2 comprise a lifting eye 54, received in bore 50, and a ball valve lever assembly 56, received in bore 52, associated with a ball valve 58 which may be fitted to the insert 10, as described further below. Where a control element need not be fitted, one or each radial bore may be sealed with a threaded plug 51, as shown at Figure 1.

The ball valve 58 comprises the ball valve lever assembly 56, a ball member 60, which is receivable through either end of the central section, and two ball member retaining covers 62 to receive the ball member 60 therebetween.

The retaining covers 62 are provided with external threads 64 to be engageable with the internal threads 20 of the central section 16. Inner ends of the retaining covers 62 are received against annular faces 68 provided near the middle of the central section 16 and integrally formed therewith. Recesses 70 are provided in the retaining covers 62 at their inner ends, the recesses 70 receiving seals 72 which engage the faces 68.

The retaining covers 62 have, between their inner and outer ends, tapered annular relief portions 78 to accommodate correspondingly-tapered portions 80 provided at the inner ends of the outer sections 18, thereby allowing for maximum retraction of the outer sections 18, within the central section 16, when the ball valve 58 is being utilised, to increase the range of length adjustment of the insert 10.

In the following description of further embodiments of the invention, like components will be designated with the same reference numerals.

The pipe insert 10 according to the second embodiment, as depicted at Figure 3, is based on a variation of the first embodiment though, in addition to having outer sections 18 at each side, comprises a pair of threadably interengaged, telescopically interconnected further outer sections 18' and 18" at each side. This makes the pipe insert 10 suitable for connecting pipe ends having a greater separation and affords the insert 10 a greater range of length adjustment.

The central section 16 and outer sections 18 are the same pieces as used in the case of the first embodiment, the additional pieces being suitably configured so that the insert 10 can accommodate a ball valve 58 (as shown in broken lines in Figure 3), with the outer sections 18, 18' and 18" fully retracted.

The further outer sections 18' are provided, at their inner ends, with external threads 22' which engage with the internal threads 41 respectively, provided in the outer sections 18. The remainders of each further outer section 18' are of a reduced diameter relative to the inner ends, so as to enable the further outer sections 18' to be received within the outer sections 18.

The further outer sections 18' are provided with internal, oppositely-handed threads 41' which engage with corresponding external threads 22" provided at the inner ends of the further outer sections 18". The remainders of each further outer section 18" are of a reduced diameter relative to the inner ends, so as to

enable the further outer sections 18" to be received within the further outer sections 18'.

The flanges 12 are mounted to the outer ends of the further outer sections 18", those outer ends being configured as described in connection with the first embodiment to provide for sealing connection with the flanges 12.

Annular locking caps 28, 28' and 28", with associated sealing arrangements therebetween, are provided at the connections between each section, the locking caps and sealing arrangements being of the type described in connection with the first embodiment.

By way of example only, the selected control elements for the second embodiment comprises a pressure gauge 80, received in bore 50, and a fill/drain point 82, received in bore 52. Again, where a control elements need not be fitted, one or each radial bore may be sealed with a threaded plug, as shown at Figure 1 in connection with the first embodiment.

The pipe insert 10 according to the third embodiment, as depicted at Figure 4, is also based on a variation of the first embodiment though the central section, instead of being straight, is provided as 90° elbow piece. The insert is thus adjustable in two non-parallel longitudinal axes and as such is adapted to provide a connection between two spaced pipe ends 11 which are arranged perpendicularly.

The radial bores 50 and 52 in the case of the third embodiment are arranged at 90°, rather than being opposed.

By way of example only, the selected control elements for the third embodiment comprise a pressure gauge 80, received in bore 50, and a lifting eye 54, received in bore 52. Again, where a control element need not be fitted, one or each radial bore may be sealed with a threaded plug, as already described.

There exist further embodiments wherein the number of outer sections provided to each side differs from that in connection with the first and second embodiments. Moreover, it will be appreciated that the number of outer sections provided to one side of the central section may differ from the number provided to the other side.

Other embodiments exist wherein there is a transverse offset between the outer section(s) to one side of the central section and the outer section(s) to the other side of the central section.

In addition, there exist alternative embodiments which are adapted to connect more than two pipe ends, for example inserts formed as tee-pieces or four-way pieces, those inserts being adjustable in some or all longitudinal axes, so as to vary the positions of the connectors according to the spacing of the pipe ends.

The method of assembly, adjustment and installation of the insert 10 will now be described in relation to the first, second and third embodiments. It will be understood that the seals associated with the various components to be assembled will already be located in place during the assembly.

Prior to assembly, adjustment and installation of the insert 10, the flanges 13, if not present already, are welded, or otherwise fixed, into position on the pipe ends 11. An accurate measurement of the separation between the flanges 13 is then made.

A determination of the appropriate number of sections from which to assemble the insert 10 is then made, such a determination being based on the size and spacing of the pipe ends 11. Assembly of the insert 10 is then commenced.

The first step in the assembly of the insert 10 will generally be that of fitting the appropriate control element(s) to, and/or plugging, the bores 50 and 52. If the ball valve 58 is required, the ball member 60 is inserted into the central section 16, and the retaining covers 62 are then screwed into either side of the

central section 16 to retain the ball member 60 therebetween. The ball valve lever assembly 56 is then screwed into the appropriate bore 50 or 52. The lifting eye 54 will often be fitted to one bore to facilitate subsequent installation of the insert 10.

The outer sections 16 are then screwed into the central section 16 and the locking caps 28 are then slid over the those outer sections 18.

If further outer sections 18' are required, they are screwed into the outer ends of the outer sections 18. Locking caps 28' are then slid over the further outer sections 18'. If additional further outer sections 18" are required, they are screwed into the outer ends of the further outer sections 18'. Locking caps 28" are then slid over the additional further outer sections 18".

The flanges 12, selected according to the dimensions of the flanges 13 to which they are to be connected, are then screwed onto the outer ends of the outermost sections 18, 18' or 18".

The interconnected sections are screwed with respect to each other until the overall length is adjusted according to the spacing of the flanges 13, allowing for gaskets and the like.

After correct adjustment of the length of the insert 10, the locking caps are screwed into position to lock the interconnected sections and to effect the sealing therebetween. The appropriate tightening torque is provided by means of hook spanners engaged with the notches 36, as described above.

The insert 10 is then installed. To this end, the lifting eye 54, if fitted, may be utilised to lift the insert 10 into position. The flanges 12 are then connected to the flanges 13 in the conventional manner to complete the installation.

The insert 10 may be adjusted in the at least one longitudinal axis, according to the longitudinal dimension(s) of the control element which will ultimately be installed in its place. The insert 10 can then be fitted during the construction

phase in the piping systems at all control element locations, allowing for the appropriate spacing and piping alignment. Testing and cleaning can then be carried out without the need to remove the insert 10.

Moreover, the mechanical integrity of the insert 10 may be approved prior to installation, thereby eliminating the need for testing of the insert 10 in the field.

It should be appreciated that the scope of the present invention need not be limited to the particular scope of the embodiments described above.

Throughout this specification, unless the context requires otherwise, the word "comprise" or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated integer or group of integers but not the exclusion of any other integer or group of integers.

Dated this ninth day of March 2004.

TINGLEWOOD TECHNOLOGIES PTY LTD
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Perth, Western Australia
Patent Attorneys for the Applicant

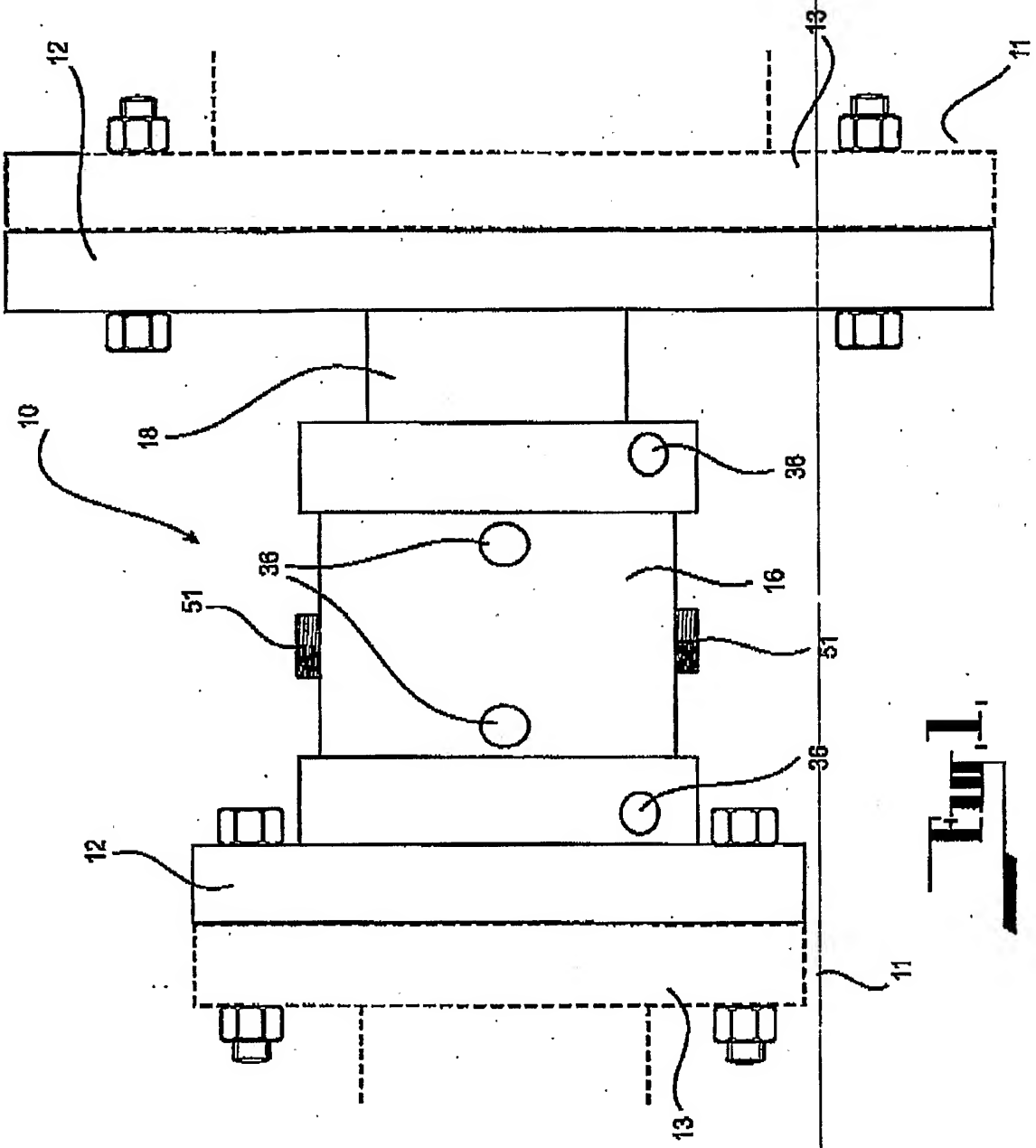

Fig. 1

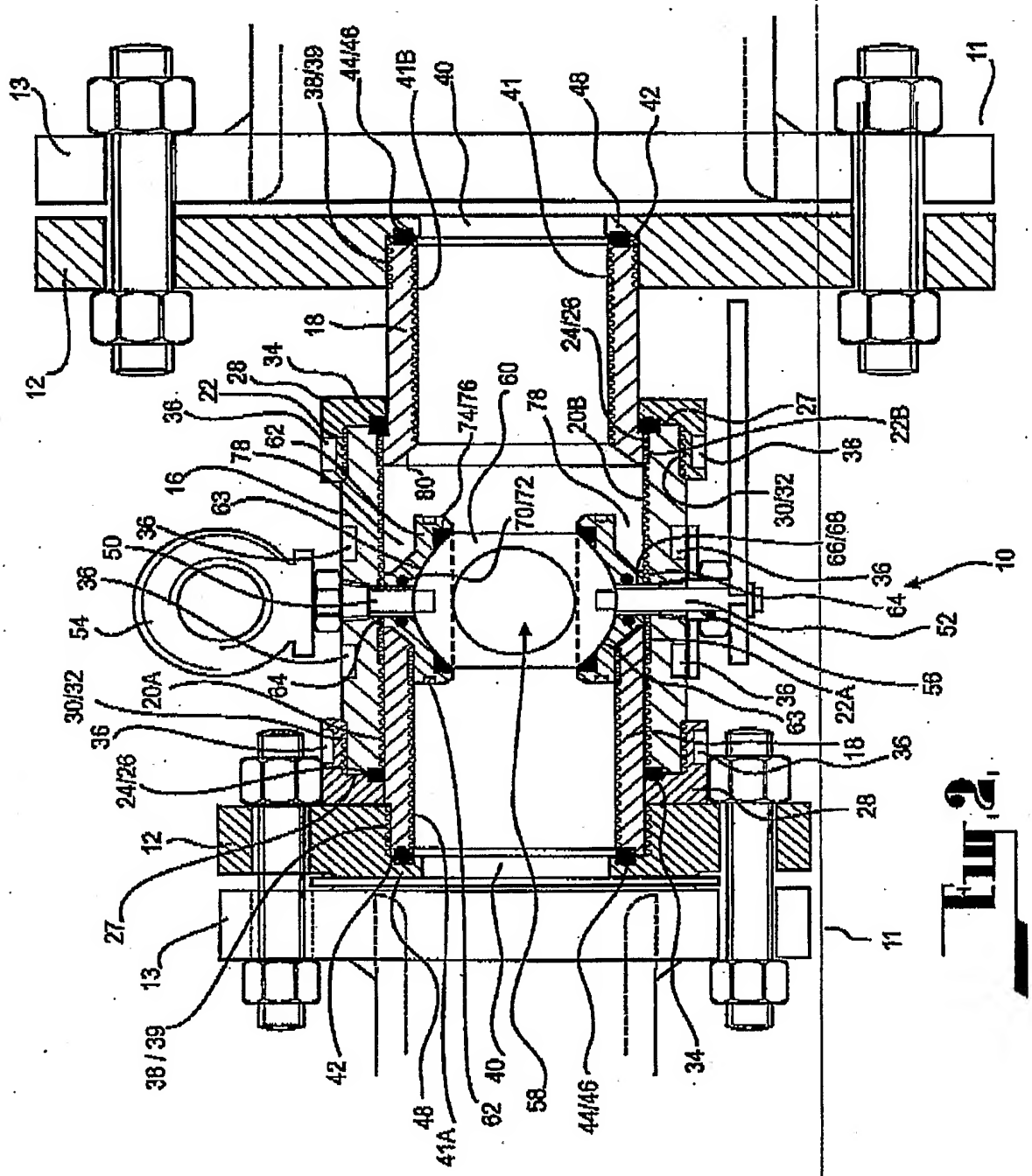
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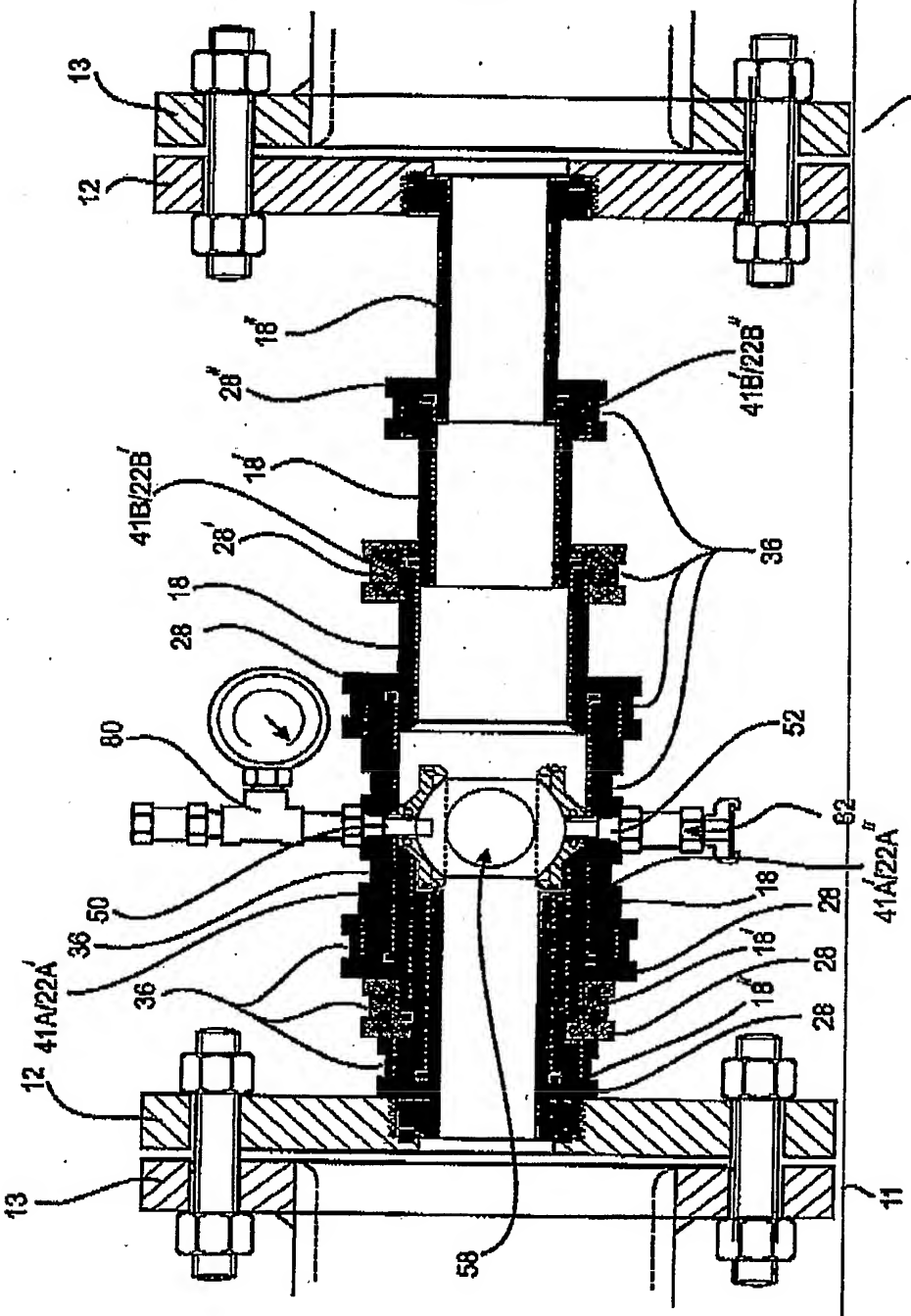
Fig 2


13
12
11
18'
28"
41B'/22B"
41B'/22B'
18'
28'
36
18
28
80
52
62
41A'/22A"
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36
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11
58

Fig. 3.

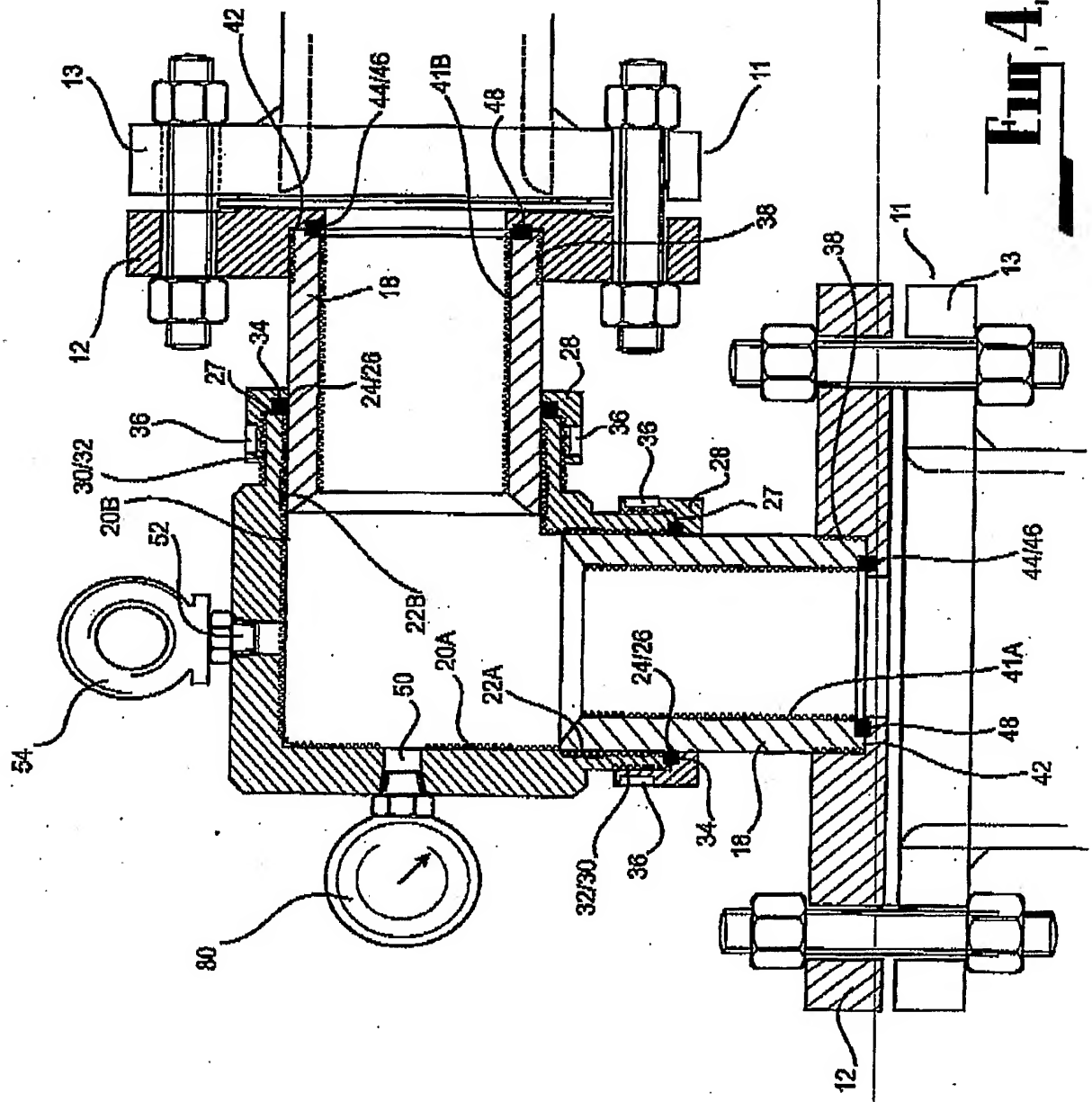
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Fig. 4